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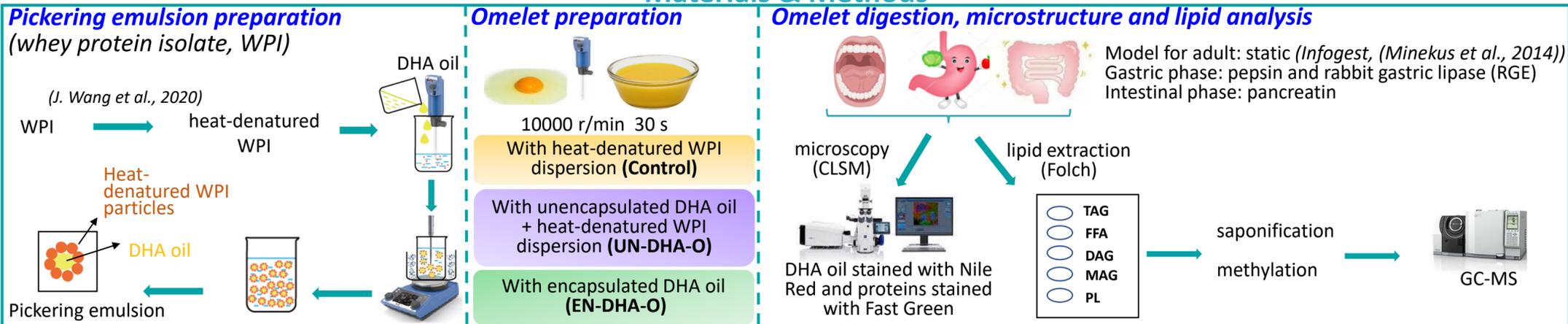
# Does encapsulation of DHA with heat-denatured whey proteins in Pickering emulsions improve its bioaccessibility?

Jun Wang<sup>1,2</sup>, Gwenaële Henry<sup>1,2</sup>, Olivia Ménard<sup>1,2</sup>, Jordane Ossemond<sup>1,2</sup>, Yann Le Gouar<sup>1,2</sup>, Sébastien Lê<sup>2</sup>, Ashkan Madadlou<sup>3</sup>, Didier Dupont<sup>1,2</sup>, Frédérique Pédrone<sup>1,2</sup>  
 1. INRAE, UMR 1253 STLO, 65 rue de Saint-Brieuc, F-35000 Rennes, France 2. Institut Agro, Agrocampus Ouest, 65 rue de Saint-Brieuc, F-35000 Rennes, France 3. Norwegian University of Science and Technology, 39000, Norwegian

## Background

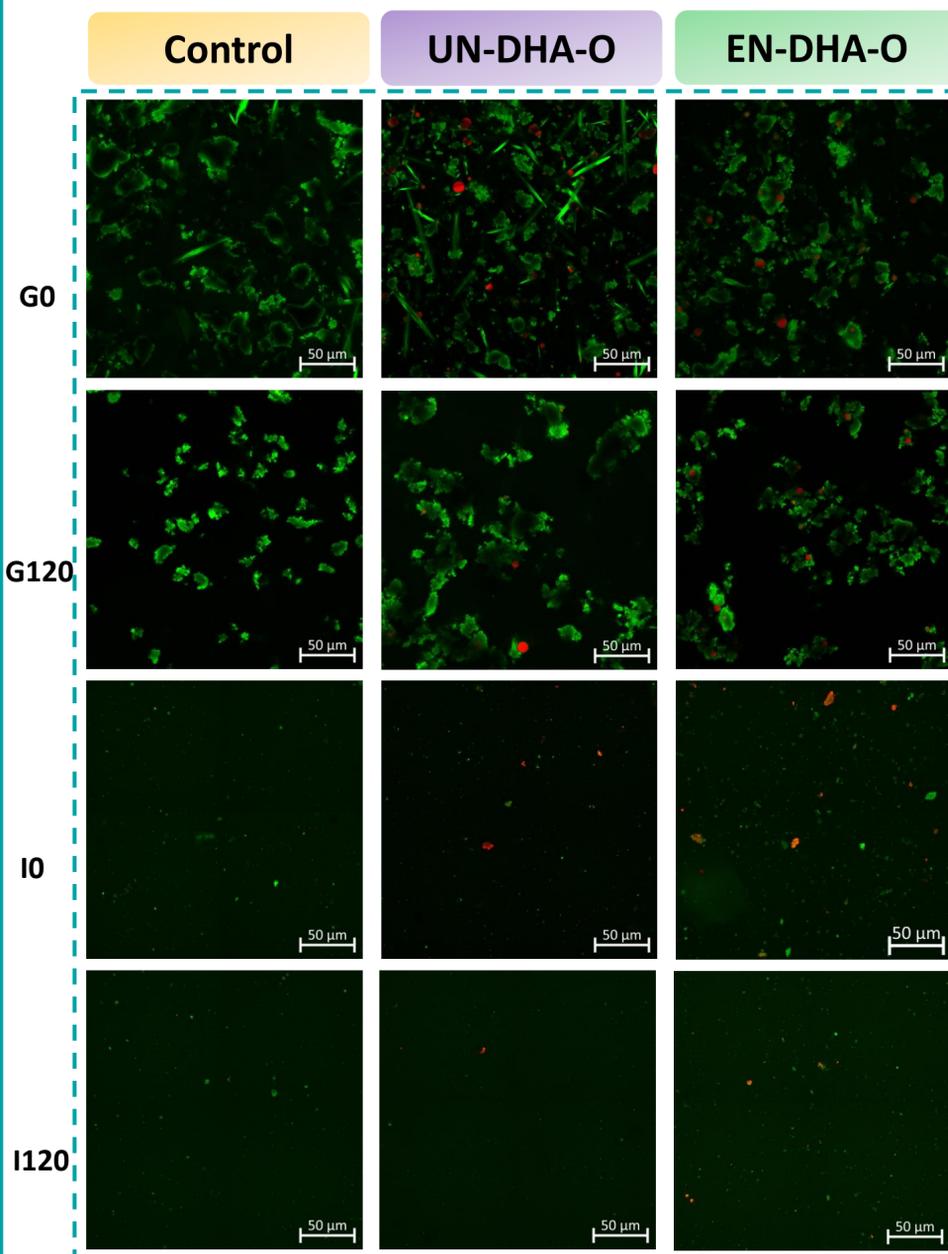
- DHA is the most important n-3 polyunsaturated fatty acids (PUFAs), mainly known for its health benefits on cognitive development and cardiovascular function. The **current intake** of DHA and EPA in the Western diet averages **150 mg** per day, less than the **recommended** daily consumption from The French Food Safety Authority for adults, which is **500 mg**.
- Oxidation** limits the enrichment of n-3 PUFAs in foods. **Encapsulation** is an effective strategy to strengthen food with n-3 PUFAs, and can also improve the oxidative status. **Pickering emulsion** has garnered exponentially increasing interest in recent years due to its excellent stability.
- Omelets** have the **highest DHA bioavailability** in various forms of DHA-rich foods (omelet, mousse, hard egg) (Pineda-Vadillo *et al.*, 2021).
- In this study, **encapsulated** and **unencapsulated** DHA oil were added to omelets respectively to obtain DHA-rich foods. Then we measured the impact of **encapsulation** of the DHA oil on the digestion of DHA carried on **triacylglycerol (TAG)**. We used an *in vitro* model of **static digestion** for adults (Infogest, (Minekus *et al.*, 2014)).

## Materials & Methods



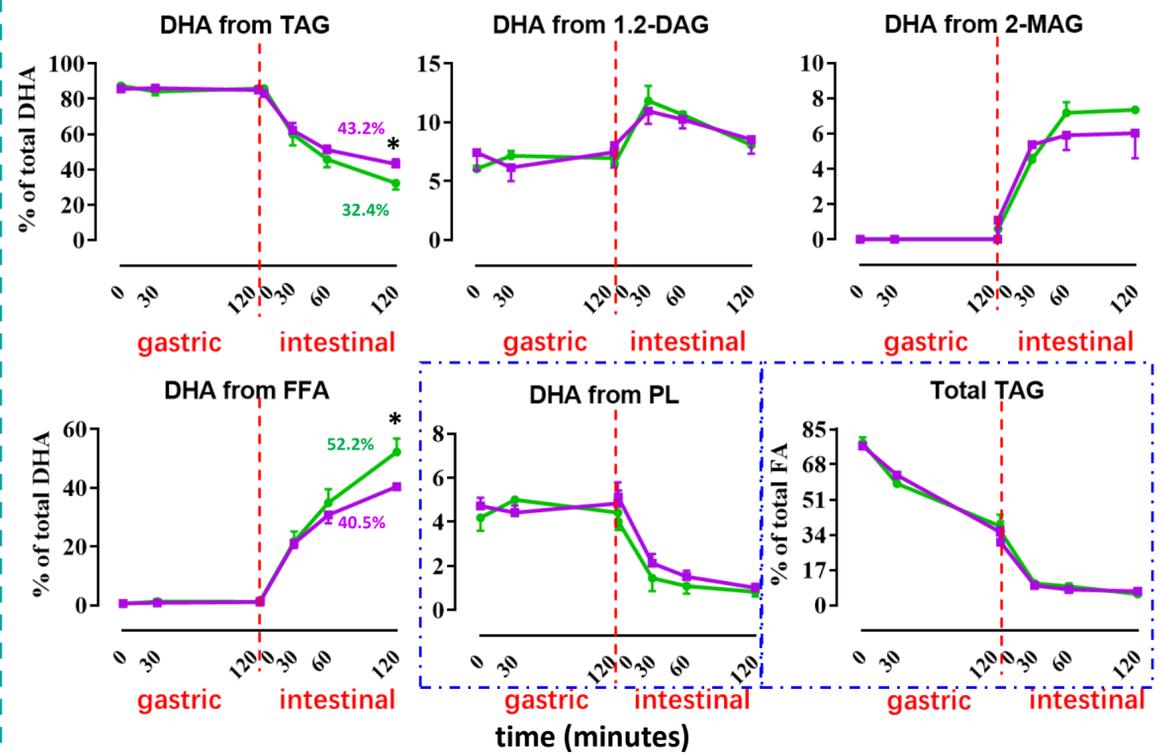
## Results & discussion

### The distribution of DHA oil in omelets during the digestion



- Droplets of DHA oil were uniformly sized and equally distributed in omelets with EN-DHA-O, contrary to UN-DHA-O.
- Digestion of the DHA oil occurred during the intestinal phase but without discrimination between groups.

### The evolution and bioaccessibility of DHA during the digestion



- DHA-TAG was only digested during the intestinal phase, leading to the sequential release of DHA as 1,2-DAG, 2-MAG or Free FA.
- At the final point of digestion, DHA-TAG was more hydrolyzed with EN-DHA-O than with UN-DHA-O. Consequently, DHA was significantly more released as DHA-FFA with EN-DHA-O than UN-DHA-O.
- DHA was also minority present in PL from eggs so the digestion was equally performed during the intestinal phase for both groups.

## Conclusions

- Our results showed that DHA-TAG was only digested in the intestinal phase as compared to the other TAG present in omelets.
- Encapsulation of the DHA oil enhanced the lipolysis of DHA-TAG. The lipase activity was probably improved because of a higher oil-water interfacial area due to the smaller droplets observed in the EN-DHA-O group.